October 1982 Vol. VII No. 10

ENDANGERED SPECIES

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Endangered Species Program, Washington, D.C. 20240

Borax Lake Chub Given Final Protection

The Borax Lake chub (*Gila boraxobius*) has been listed by the Service as an Endangered species, and the small area in which it occurs has been designated as Critical Habitat (F.R. 10/5/82). Without this protection, geothermal drilling in the immediate vicinity of the fish's restricted range and human modification of the lake itself could jeopardize the chub's survival by disrupting its fragile habitat. An earlier emergency listing, now expired, gave the fish and its habitat temporary protection from any immediate geothermal development threat, and the final rule allows conservation on a permanent basis.

Background

The Borax Lake chub was first collected in about 1940, and was described in 1980 (Jack E. Willilams and Carl E. Bond, *Proceedings of the Biological Society of Washington*, 93(2), 1980, pp. 291-298). It is a dwarf species of *Gila*, with adults typically reaching a total length of only 38-55 mm, and it is the only member of that genus adapted to high water temperatures throughout the year. This fish is endemic to the Borax Lake area, an unusual aquatic ecosystem located in the high desert of the Alvord Basin, Harney County, southeastern Oregon. During the Pleistocene Epoch, the basin floor was covered by an extensive system of interconnecting lakes. As the region became very arid, the lakes dried and the aquatic organisms were isolated in the remaining springs and creeks, resulting in speciation in response to varying selective pressures within the distinct ecosystems. The Alvord chub (*Gila alvordensis*) also is restricted to the Alvord Basin but occurs in a number of springs and creeks, and it is not found in Borax Lake.

The 640-acre area covered by the rule, consisting of 10-acre Borax Lake, Lower Borax Lake, and their associated marshlands, is fed by a series of thermal springs with waters high in dissolved mineral salts. Over thousands of years, sodium borate and other minerals have been deposited around the edges of Borax Lake, gradually raising the lake level to about 10 meters above the basin floor, and further isolating the chub from surrounding watershed. Borax Lake has been experiencing increased threats from human use. Its position—perched above its surroundings—makes it extremely susceptible to disturbance. In 1980, a modification of the lake perimeter and rechannelizaiton of the outflow to divert water for irrigation slightly lowered the lake level. Reduced lake levels would affect the chub by decreasing the available habitat and increasing water temperatures.

A second and perhaps greater threat to the chub is geothermal development. The entire Alvord Basin is classified as a Known Geothermal Resource Area within which the Bureau of Land Management (BLM) has already leased rights to a private energy development company for exploratory drilling. Such development could severly alter the species' habitat. Because of the possibility of interconnecting aquifiers and spring sources, drilling near the lake could alter the underground water system and, in effect, drain the lake (which is at a higher level than most potential drilling sites). Not only could water levels be reduced, or even eliminated, but water pressures and temperatures could be altered. These threats first reached a critical stage in 1980, leading to the emergency listing.

Regulatory History

On May 25, 1980, the Service issued its emergency rule designating the chub as Endangered and determining its Critical Habitat. The Critical Habitat was drawn to include Lower Borax Lake and adjacent marshlands because the chub has been know to occur periodically in these areas and because terrestrial insects dependent on these wetlands make up a significant portion of the chub's diet. Although Borax Lake proper is privately owned, most of the affected area is public land administered by BLM.

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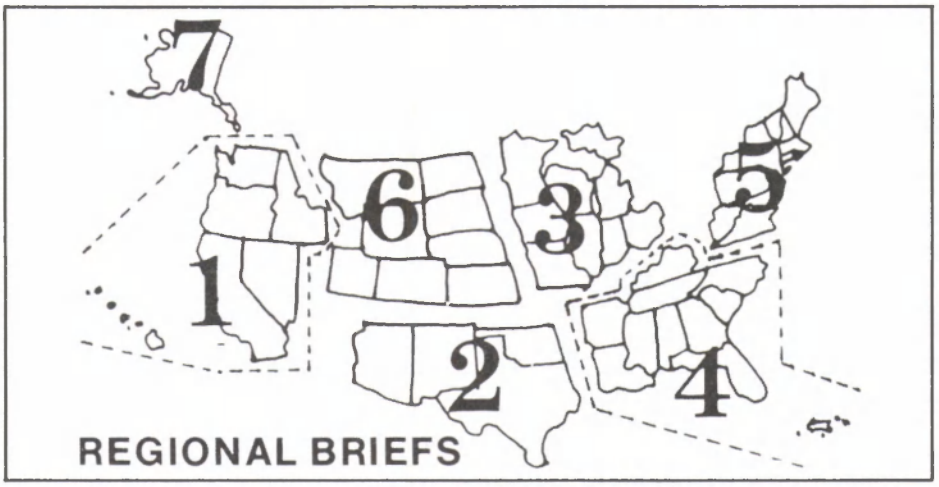
"The Endangered Species Act Amendments of 1982" were signed by President Reagan on October 13th. The amendments, which affect all major portions of the 1973 Act, will receive feature coverage in the November BULLETIN.

Photo by James D. Williams

Sodium borate deposits developed from the evaporation of borax-laden water from the Borax Lake are shown the the foreground. The deposits have formed over several thousands of years.



REGIONAL BRIEFS

Endangered Species Program regional staffers have reported the following activities for the month of September:

Region 1 — Two peregrine falcons (*Falco peregrinus*) which were banded in the late spring of 1981 in California have been recovered. One falcon with an injured wing was found near Lewiston Reservoir in Shasta County in early September, not far from where it was banded in Humboldt County. This bird is presently being rehabilitated at the Santa Cruz Predatory Bird Research Group Lab. The second falcon, banded near Leggett, California, was killed in the State of Sonora, Mexico, in January 1982. This documents for the first time that a California peregrine falcon has migrated to Mexico where organochlorine pesticides are still in widespread use.

The results of peregrine falcon hacking attempt in the Northwest (Oregon and Washington) have not been good for 1982. This was the first year efforts were made to hack falcons in the State of Washington. A total of six chicks were hacked from two sites (see August and September 1982 BULLETINS). Four were believed to have fallen to natural predators, more likely the great horned owl (*Bubo virginianus*). The remaining two may have successfully fledged, but faulty radio transmitters did not allow close surveillance.

Region 2 — A study is being initiated on Aransas National Wildlife Refuge to evaluate the potential of the refuge uplands to support whooping cranes (*Grus americana*) and the effects of prescribed burning and grazing upon this habitat.

Nearly 15,000 razorback suckers (*Xyrauchen texanus*) were stocked in the Verde River in Arizona as part of the continued reintroduction effort for this species. A series of contracts was let to the Arizona Department of Game and Fish to 1) study potential reintroduction sites for the Colorado River squawfish (*Ptychocheilus lucius*) and woundfin (*Plagopterus argentissimus*), 2) conduct a status survey for the Little Colorado spinedace (*Lepidomeda vittata*), and 3) initiate a radio-tagging study of Sonoran pronghorns (*Antilocapra americana sonoriensis*).

Surveys for black-footed ferrets (*Mustella nigripes*) were conducted on the Jicarilla Indian Reservation and on some BLM lands in New Mexico. Encouraging ferret signs were found on the Jicarilla Reservation.

A bald eagle (*Haliaeetus leucocephalus*) nest constructed near Horseshoe Reservoir in Arizona was elevated on an artificial platform so that rising reservoir waters would not innudate the nest this year.

Region 3 — Endangered Species Specialist James Engel recently attended an annual meeting on natural areas in which concern was voiced about conservation of the Driftless Area. This is an unusual region made up of parts of Minnesota, Wisconsin, Iowa, and Illinois that escaped the effects of glaciation and contains a number of relict species that originated in the Pleistocene Epoch. Among the area's vulnerable species are the Iowa pleistocene snail (*Discus macclintocki*) and the northern wild monkshood (*Aconitum noveboracense*).

Region 3 recently hosted an Eastern Peregrine Falcon Recovery Team meeting. Forest Service representatives

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U.S. Fish and Wildlife Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the Virgin Islands. **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska.

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RULEMAKING ACTIONS September/October 1982

Pine Barrens Treefrog Proposed Delisting

The Service has proposed to remove the Florida population of Pine Barrens treefrog (*Hyla andersonii*) from the U.S. List of Endangered and Threatened Wildlife and Plants and to rescind the Critical Habitat that has been designated for this population (F.R. 9/15/82). Recent evidence indicates that the frog is much more widely distributed than originally known.

Background

When the treefrog was listed as Endangered (F.R. 11/11/77), the only known existing breeding sites were limited to seven small areas in Okaloosa County, and the population was thought to total less than 500 individuals. However, data now available expand the Florida distribution to a total of at least 119 sites in Okaloosa, Walton, Santa Rosa, and Holmes Counties.

in the spring of 1978, the Florida Game and Fresh Water Fish Commission (FGFWFC) began a project to better assess habitat needs and distribution limits of the treefrog within Florida. Surveys conducted during 1978 and 1979 revealed a number of new populations. Because of the more widespread distribution of the treefrog, the Service contracted with FGFWFC in December 1979 to develop recommendations regarding possible reclassification. The report subsequently transmitted to the Service in January 1980 titled "The Florida Population of the Pine Barrens Treefrog (*Hyla andersonii*), A Status Review," recommended that the frog be removed from the Federal list.

During the Florida surveys, incidental investigations were conducted in nearby Alabama areas revealing six other sites in Escambia and Covington counties where the treefrog is established. A 1980 survey of southern Alabama turned up an additional 16 populations in the Geneva-Escambia-Covlngton County areas. Knowledge of these Alabama populations provides further evidence of the treefrog's overall well-being in what is essentially a single Florida-Alabama population unit that is much larger than originally suspected.

Although the frog appears to be limited to only four counties in Florida, it is of widespread occurrence within this area. In addition, a considerable amount of habitat which is very likely to harbor the frog has not yet been investigated. These two factors suggest that the Florida population is relatively secure for the immediate future.

Threats to the Species

The final rule listing the treefrog as Endangered (F.R. 11/11/77) indicated that development and land clearing for agricultural use had destroyed four of the 11 known population sites within the 7-year period following the frog's discovery. The most recent data do not substantiate such a severe trend in habitat loss.

Of the 112 new habitat sites surveyed by FGFWFC between May 1978 and June 1980, four had been degraded to some degree by siltation or runoff, but still supported frogs. Fifteen of the localities were within or adjacent to clear-cut areas, but there was no immediate evidence of adverse effects to the frog population.

To date, drainage of bogs for agricultural or silvicultural purposes has not been extensively practiced within the Florida range. Some of the Pine Barren treefrog's habitat has likely been lost through the creation of artificial lakes and ponds within the bog areas. Man-made impoundments are common throughout the treefrog's Florida range, and new impoundments will likely continue to pose at least a minor threat.

Many of the subcllmax communities, herb bog and shrub habitats required by the Pine Barrens treefrog have apparently disappeared during the last several centuries as the result of wildfires being suppressed or limited through human activity. However, some evidence suggests that other disturbance factors may be suitable substitutes for fire. Clear-cutting, such as may occur with the construction and maintenance of electric and gas transmission lines, increases groundwater seepage by reducing evapotranspiration, thus contributing to the formation of herb bogs. Numerous populations were found along such transmission lines during the 1978-1980 surveys.

Comments concerning this proposal should be sent by November 15, 1982, to the Regional Director (ARD/FA), U.S. Fish and Wildlife Service, 75 Spring Street, S.W. Atlanta, Georgia 30303.

Service Conducts 5-Year Review

The Service has initiated a review of animals and plants listed during 1977 to insure that the species' most current status is accurately reflected by the Endangered or Threatened classification now assigned them under the Endangered Species Act of 1973, as amended (F.R. 9/27/82). The Act requires the Service to conduct a review of all listed species at least once every 5 years.

The public, other concerned governmental agencies, the scientific community, industry, and any other interested parties are invited to submit comments on the status of the species listed below. These comments must be in writing and should contain the name, signature, telephone number, and the association, institution, or business, if any, of the party. Comments must be received by the Service by 1/25/83.

The Service will acknowledge in writing all comments received. If, as a result of this review, any present classifications as Endangered or Threatened are found to be inconsistent with current evidence, the Service will propose the appropriate changes of classification.

Submit comments to Regional Director (FA), U.S. Fish and Wildlife Service, Suite 1692, Lloyd 500 Building, 500 N.E. Multnomah Street, Portland, Oregon 97232 (species 1, 2, 3, 4, 6, 17, 18, 19, 20) or Regional Director (FA), U.S. Fish and Wildlife Service, Richard B. Russell Federal Building, 75 Spring Street, S.W., Atlanta, Georgia 30303 (species 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16).

Species Under Review:

1. Otter, southern sea, *Enhydra lutris nereis;* 2. Mallard, Marianas, *Anas oustaleti*; 3. Shrike, San Clemente loggerhead, *Lanius ludovicianus mearnsi*; 4. Sparrow, San Clemente sage, *Amphispiza belli clementeae*; 5. Anole, Culebra giant, *Anolis roosevelti*; 6. Lizard, island night, *Klauberina riversiana*; 7. Lizard, St. Croix ground, *Ameiva polops*; 8. Snake, Atlantic salt marsh, *Nerodia fasciata*· 9. Coqui, golden, *Eleuthrodactylus jasperi*; 10. Treefrog, pine barrens, *Hyla andersonii*; 11. Cavefish, Alabama, *Speoplatyrhinus poulsoni*; 12. Chub, slender, *Hybopsis cahni*; 13. Chub, spotfin, *Hybopsis monacha*; 14. Darter, slackwater, *Etheostoma boschungi*; 15.Madtom, yellowfin, *Noturus flavipinnis*; 16. Riffle shell clam, tan, *Epioblasma walkeri;* 17. Fabaceae-Pea family, *Lotus dendroideus (=scoparius)* ssp. *traskiae*, San Clemente Island broom; 18. Malvaceae-Mallow family, *Malacothamnus clementinus*, San Clemente Island bush-mallow; 19. Ranunculaceae-Buttercup family, *Delphinium kinkiense*, San Clemente Island larkspur; 20. Scrophulariaceae-Snapdragon family, *Castilleja grisea*, San Clemente Island indian paintbrush.

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Madison Cave Isopod Listed as Threatened

The Madison Cave isopod (*Antrolana lira*) has been listed by the Service as a Threatened species (F.R. 10/4/82). This small freshwater crustacean, which is restricted to a single cave and an adjoining fissure, is jeopardized by vandalism, habitat damage from unauthorized visitors, and mercury pollution.

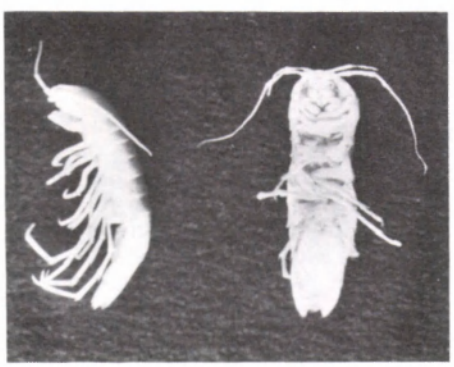
Background

The earliest known collection of the Madison Cave isopod was made in 1958 by Dr. Thomas Barr of the University of Kentucky, and the species was described in 1964 (*International Journal of Speleology,* Vol. 1, pp. 229-236 and plates) by Dr. Thomas E. Bowman of the Smithsonian Institution. Not only is this species the only member of its genus, but also the only freshwater representative of its family (*Cirolanidae*) north of Texas. The isopod is about 12 mm in length and, like some other cave-dwelling creatures, lacks pigment and eyes. It has been found only in three small pools of water in Augusta County, Virginia. Two of these pools are in Madison Cave, and the other is in a nearby fissure.

One threat to the isopod is unauthorized human visitation to the cave, which has resulted in trash accumulation and siltation in the pools. A recent study has also found that persons standing on the steep talus banks cause the clay talus to creep down into the pools. These factors are reducing the size and quality of the isopod's very limited habitat. The species also is exposed to mercury contamination from the nearby South River, which apparently is connected with the cave by a subterranean stream. Although the chemical factory that was the source of the pollution is no longer active, the mercury, a heavy metal, persists in the river sediment and is being slowly released into the water.

The Madison Cave isopod was first proposed as a Threatened species in 1977. In accordance with the listing deadline imposed by the Endangered Species Act Amendments of 1978, the proposal was withdrawn in 1979. Based on significant new information about threats to the isopod, it was reproposed as Threatened on October 6, 1980. During the subsequent public comment period, no position on the proposal was taken by the State of Virginia. Comments from the U.S. Army Corps of Engineers stated that it has no current projects in the Madison Cave area, and that the effect of a potential project, the Verona Dam and Lake, would be investigated should studies on that facility be reactivated. In its response, the Service added that any detrimental effects of the project, if reactiviated, would be unlikely. Comments in support of the listing were received from Dr. John R. Holsinger of Old Dominion University and Dr. Thomas E. Bowman of the National Museum of Natural History. Additionally, a 1982 ecological study of the isopod by T.L. Collins added much to the knowledge of the species and confirmed the threats to its continued existence.

Critical Habitat was not designated for the isopod because publication of a map of its extremely restricted distribution would add to the danger of vandalism. Nevertheless, the habitat conservation measures outlined in Section 7 of the Act do apply. Federal agencies now are required to insure that any actions they authorize, fund, or carry out will not likely jeopardize the continued existence of the Madison Cave isopod.



The Madison Cave isopod, a small freshwater crustacean, is restricted to a single cave and an adjoining fissure in Augusta County, Virginia.

Photo by Christopher P. White

Foreign Species Proposal Expires

A 1980 rulemaking which proposes as Endangered the U.S. population of the thick-billed parrot (*Rhynchopsitta pachychynchus*), shorttailed albatross (*Diomedea albatrus*), margay cat (*Felis wiedii*), and jaguar (*Panthera onca*) has been withdrawn by the Service F.R. (9/17/82). The 2-year time limit for proposed rulemakings, mandated by the 1978 amendments to the Endangered Species Act of 1973, has expired for this proposal.

The listing of the U.S. population of the ocelot (*Felis paradlis*), which was proposed at the same time as the above species, was finalized on July 21, 1982. (See the August 1982 BULLETIN for details.) Foreign populations of all five species are listed under the Act as Endangered.

BORAX LAKE CHUB

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During the 240-day life of the emergency rule, consultations with the BLM on geothermal exploratory drilling were initiated pursuant to Section 7 of the Endangered Species Act. As part of the BLM leasing process, the Anadarko Production Company, the lease holder around Borax Lake, agreed to a lake monitoring program. The company also agreed to a stipulation that any change in the water quality or quantity of Borax Lake caused by its drilling would result in suspension of operations until the problem is identified and resolved.

In order to insure continued conservation of the chub and its habitat, the Service proposed a final listing and Critical Habitat rule on October 16, 1980. Fourteen written comments were received in response to the proposal. The Governor of Oregon, the Oregon Department of Fish and Wildlife, and the BLM generally supported the proposed listing, as did two local conservation organizations and five individuals.

Concern about the potential affect of a Critical Habitat determination on geothermal development was voiced by Anadarko, the local chamber of commerce, and the Harney County court. Only one of those responding, an individual, expressed outright opposition, again out of concern about possible restrictions of geothermal drilling. A public meeting on the proposal was held in Burns, Oregon, on November 13, 1980. At a subsequent public hearing on December 2, 1980, also at Burns, comments similar to the written responses were received.

Effects of the Rule

After analysis of the available scientific data, economic information, and responses to the proposed rule, the Service designated the Borax Lake chub an Endangered species and determined a 640-acre area (including Borax Lake, Lower Borax Lake, and their adjacent marshes) Critical Habitat. All Provisions of 50 CRF 17.21 and 17.23 now apply, including the prohibitions on taking the species and on interstate or international commerce. There are many kinds of actions that can be carried out within the Critical Habitat of the Borax Lake chub without adverse effects, and indeed no activity is automatically excluded.

Under the existing monitoring program and geothermal leasing provisions formulated in 1980, the Service foresees no significant impact of the listing rule on geothermal explorations. Anadarko has already voluntarily delineated a zone slightly larger than the Critical Habitat within which it does not plan to drill.

Puerto Rican Parrot Recovery Program Shows Progress

by James W. Wiley
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Although the wild population is still precariously close to extinction, several developments from research on captive productivity and increasing wild nesting success have been encouraging in the effort to recover the critically Endangered Puerto Rican parrot (*Amazona vittata*). The research is a cooperative program with the U.S. Forest Service (USFS), and is being conducted within Patuxent's Endangered Species Ecology Section and the USFS Institute of Tropical Forestry.

From an all-time low of 13 birds in 1975, the wild population has shown a slow but substantial increase in numbers. In 1980, 8 chicks fledged from 3 nests, and in 1981, a program (1968 to present) record of 10 chicks fledged from 3 nests, for a minimum wild population of 29 birds in July 1982. Yet, despite improved nest success and productivity of parrot pairs, the numbers of breeding pairs in the wild has not shown the expected rate of growth, apparently because of losses of subadult birds. The poor survivorship of non-breeding birds is believed primarily the result of predation by raptors such as the red-tailed hawk (*Buteo jamaicensis*) and wintering peregrine falcon (*Faico peregrinus*). Most mortality apparently occurs in the first year. Breeding adult parrot survival has been very good, and none have been lost since 1976 while two new pairs have been recruited into the breeding population.

All parrot pairs are using improved natural or artificial nest sites designed to discourage pearly-eyed thrashers (*Margarops fuscatus*) from entering the nests. Thrashers are provided with their own nest sites, of sizes and dimensions more to their preferences, near the parrot nests. By defending its own nest territory, a resident thrasher effectively keeps other thrashers away. Although they formerly were the most critical problem affecting parrot nesting success, thrashers are not currently a serious threat.

Twice we have recorded wild Puerto Rican parrots producing replacement clutches when their first set of eggs failed. Based on this and experiments with captive Puerto Rican and similar, non-listed Hispaniolan (*A. ventralis*) parrots, an attempt was made to artificially "double-clutch" a wild pair in 1980. The female had been laying nonviable thin-shelled eggs for several years. We transferred each of the thin-shelled eggs to the field station incubator as they were laid, and replaced them with plaster dummies. Once the female completed her clutch, the dummies were removed in the hope that she would replace them with a second clutch. She did lay an additional two fertile eggs and, although the eggs failed to hatch, the double-clutching technique does show good potential for increasing wild production.

Progress with Captive Production

The recovery effort for the wild Puerto Rican parrot population is closely associated with the captive propagation program at the Puerto Rico Field Station in the Luquillo Forest. Along with serving as insurance against loss of the species by disease or natural disasters, the captives are being used to bolster the wild population. The captive flock now stands at 15 birds, composed of 6 males, 8 females, and 1 chick (sex undetermined). Two of the five pairs have produced fertile eggs; five chicks have been produced at the aviary, and four of these have been fostered into wild nests. Fostering is the best strategy for achieving success in getting captive-produced chicks into the wild, as they will closely associate with the foster parents for an extended post-fledging dependency and learning period.

In 1979, the first captive-produced chick fledged from a wild nest after the foster parents failed to produce chicks of their own. The next year, two captive-produced chicks were fostered into that nest after all of the wild pair's eggs again failed to hatch. In 1981, one captive-produced nestling was fostered into a different nest already containing chicks of its own. Although we have found it best to place chicks when they are less than one-quarter grown, the 1981 chick could not be slipped into the nest until it was half-grown because of situations requiring our attention at other nests. As it had been hand-raised in a brooder, the youngster initially had some difficulty in learning to take food from its foster parents. For a while, we had to remove it from the nest at least once daily for supplemental feeding but the chick was eventually weaned from our care and it fledged along with its foster siblings.

To test whether wild pairs can adequately raise an additional chick, we have twice artifically increased the normal brood of three chicks to four. In both cases, the additional chick was accepted and all young showed excellent growth rates and fledged successfully. Further experiments may reveal that brood sizes can be further increased.

Use of Surrogates

A flock of 28 Hispaniolan parrots is also being maintained at the field station aviary, and these birds have proven themselves invaluable as surrogates. For example, they have raised captive-produced Puerto Rican parrot eggs and chicks where the adults were being double-clutched or had rejected their eggs. Eggs and chicks salvaged from some wild nests where they were jeopardized by storms, predation, or other factors also have been fostered under captive Hispaniolans. These birds are able to do a more reliable job of incubating and brooding than we can achieve with mechanical devices. The surrogate parents are also more efficient in raising nestlings, as we have to feed the chicks hourly around the clock to achieve the growth rates desired. (Fostering chicks under surrogates saves wear and tear on biologists, too). Hispaniolan parents also serve to "train" young Puerto Rican parrot chicks before they are fostered into wild nests. If these chicks are placed directly into wild nests after hand-raising, they will sometimes be intimidated by the presence of other young birds in the nest and by the adults' presence. An intermediate period with a Hispaniolan parrot gives the hand-raised chick some preparation for its new environment.

Some first-time Puerto Rican parrot parents have been extremely clumsy or awkward with their eggs and chicks, and we have not trusted them with their own offspring. Instead, we have used Hispaniolan chicks and eggs to "train" adult Puerto Rican pairs in the skills required to care for their progeny. After proving themselves, Puerto Rican adults have been allowed to raise chicks of their own species. The surrogate species has served as a "stand-in" at wild nests, too. In situations we judge too dangerous to leave a Puerto Rican parrot chick in a wild nest, we substitute a Hispaniolan parrot of appropriate age until the threat has been eliminated. In one wild nest, the nonviable eggs were far overdue for hatching and the female was about to desert when we fostered a just-hatched Hispaniolan chick into the nest. The female immediately settled into the task of raising the chick. We could not have afforded to chance this switch with a more valuable Puerto Rican chick, as the risk in leaving the nestling in a poorly

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PARROT

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attended nest at that age would be far too great. At an appropriate age, we replaced the Hispaniolan with a Puerto Rican parrot chick.

Increased Egg Production

Double-clutching to increase egg production has been successful with both species. In 1981, an experiment with Hispaniolan parrots suggested that sequential removal of eggs could increase production substantially above that obtained by whole clutch removal. By removing the entire clutch at once, we have twice been able to get a total of nine eggs (five in first clutch, four in second) from one Hispaniolan female. But with a sequential removal of eggs from the same female, she laid 21 eggs before the experiment was stopped, of which 20 were fertile. An important aspect of this technique is that egg-laying birds can be synchronized with other breeding birds (wild or captive). If captive Puerto Rican parrots or Hispaniolan surrogates are started laying earlier than the wild population by stimulation through an artificial photoperiod regime, and if the eggs are removed as the females lay them, the captives are essentially held in "readiness" until the wild population begins to lay.

Once the removal of eggs ceases, the manipulated birds begin incubating. Chicks of appropriate ages can then be produced for fostering into wild nests either to serve as surrogates or to supplement wild Puerto Rican parrot production, and adult Hispaniolan parrots can be synchronized to receive captive or wild-produced eggs and chicks. In the 1981 experiment, the female Hispaniolan parrot was allowed to incubate her last two eggs (numbers 20 and 21). She did so for 32 days, far beyond the normal 27-day incubation period for Hispaniolan parrots. This is particularly impressive because she had been laying eggs for over 2½ months before she was finally permitted to begin incubation.

Future Research Directions

Because the single wild population is vulnerable to tropical storms or disease, the reestablishment of other Puerto Rican parrot populations elsewhere on the island is essential to the survival of the species. Future research will focus on developing techniques for releasing free-flying birds. Captive-produced Hispaniolan parrots of several age classes will be released in an area of their native Dominican Republic where healthy populations still occur. Release techniques will be developed, and observations will be made on how the captive-raised birds integrate into wild flocks. Movement and survival will be monitored using small radio-transmitters, providing information vital in future introduction procedures for Puerto Rican parrots in the Luquillo Forest and other sites in Puerto Rico. The telemetry system will also aid in the study of post-fledging mortality of the Endangered parrots, another major research goal in the years ahead.

Additional information may be obtained by contacting Dr. John G. Rogers, Jr., Acting Director, Patuxent Wildlife Research Center, or Dr. H. Randolph Perry, Jr., Leader, Endangered Species Section (U.S. Fish and Wildlife Service, Laurel, Maryland 20708).

Photo by Helen Snyder

Mutual preening in captive Puerto Rican parrots. Luquillo Forest, Puerto Rico.

Plans Approved for Cavefish and Eagle

The Service's Director signed two recovery plans during September, bringing the total of approved recovery plans to 59. The Southwestern Bald Eagle Recovery Plan was signed on September 8 and the Alabama Cavefish Recovery Plan on September 17. Copies of these plans will be available in four to six months from the Denver Fish and Wildlife Reference Service, Unit i, 3840 York Street, Denver, Colorado 80205 (800/525-3426).

The Southwestern Bald Eagle Recovery Plan presents recovery actions for the bald eagle (*Haliaeetus leucocephalus*) population included in Oklahoma, Texas west of the 100th meridian, all of New Mexico and Arizona, and that area of California bordering the Lower Colorado River. Prior to the mid-1970's, no data existed to document the population size or distribution of the eagle in this area. The conjecture that the eagle population was declining can only be inferred.

Presently, 13 breeding territories of the southwestern bald eagle are known and all contain varying expanses of mature streamside forests. Though the relationship is not fully understood, suitable riparian habitat appears to be an essential prerequisite to successful eagle reproduction.

The southwestern bald eagle reaches its greatest density in the Salt and Verde River systems of central Arizona where 12 of the 13 known breeding territories are found. It is estimated that 50 percent of the apparently suitable habitat in the Salt and Verde River systems is presently unoccupied. In addition, riparian forests and perennial streams in adjacent drainages appear suitable for nesting bald eagles. The recovery planners recommend that the southwestern bald eagle not be downlisted until the reproductive effort has been effectively doubled and the population range has expanded to include one or more of these river drainages in addition to the Salt and Verde systems.

Reproductive health of the southwestern bald eagle appears to be good, as evidenced by hatching success and low pesticide content of eggs. Most reproductive loses appear to be associated with accidental deaths of embryos and nestlings.

The recovery team proposes the following guidelines to recover the species: (1) Maintain and protect the existing nesting territories; (2) enhance nesting territories to increase the production of young above the present average of 1.02 fledglings per active nest; (3) continue using a production

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CAVEFISH AND EAGLE

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index and annual monitoring program to determine whether the population is increasing, decreasing, or stable; (4) identify, maintain, and improve wintering habitat; and (5) promote research that will lead to increased eagle survival.

Considering the extant breeding population, recovery team members and consultants consider artificial rearing of southwestern bald eagles to be unwarranted at this time. However, in the event of significant decline in reproductive success, the recovery plan recommends a contingency plan for artificial propagation.

For more information regarding the Southwestern Bald Eagle Recovery Plan, contact the Regional Director, U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, New Mexico 87103.

The Alabama cavefish (*Speoplatyrhinus poulsoni*) is known from a single site, Key Cave in Lauderdale County, Alabama. It is the rarest of American cavefish and, probably, one of the rarest freshwater fish. It was described in 1974 on the basis of nine specimens from the type locality.

The Alabama cavefish's distribution is characteristic of relicts, occurring in a limited area at the periphery of a broader family range. It is quite possible, based on superficial geological and hydrological grounds, however, that the fish does not exist in a single, isolated pocket, but is somewhat more widespread and more abundant than is currently known. Speological explorations and biospeological investigations of the limestone caves of northwestern Alabama have not been as extensive as those in the northeastern part of the State, so it is appropriate to anticipate the eventual discovery of additional *S. poulsoni* sites. Searching for additional sites of the Alabama cavefish is a primary strategy in planning the recovery of this fish.

The Alabama cavefish was described in 1974 [*Copeia* (2):486-493] by M.R. Cooper and R.A. Kuehne. It has a greatly flattened snout and no externally visible eyes. It ranges from 31.2 to 58.3 mm, but its maximum size is not known. The species has no obvious pigment and looks generally pinkish-white. The body covering, fins, fin rays, and elements of the cranial skeleton are quite transparent. The fish can be readily distinguished from other amblyopsid cavefishes.

Key cave is a large, multi-level maze, with two interconnected entrances. The entrances are on land administered by the Tennessee Valley Authority, but much of the cave underlies land that is not within the Pickwick Reservation boundaries and is used for cotton farming. The cave is largely unexplored.

Algae, ferns, and a few other plants can be found at the entrances and twilight zones of the cave. Many guanobites can be found just beyond the twilight zones. Source of the guano is a large summer nursery colony of the Endangered gray bat (*Myotis grisescens*). Although the absolute importance of the gray bat to the ecology of the Alabama cavefish is unknown, it is certainly a primary biotic source of energy at Key Cave. Therefore, another provision of this recovery plan is to implement the Gray Bat Recovery Plan.

The first objective of the Alabama Cavefish Recovery Plan is to assess the status, distribution, ecology, and threats to the species in order to assess that the fish's needs for survival are known and met. A later objective is to consider removing it from the U.S. List of Endangered and Threatened Wildlife and Plants if conditions warrant.

For more information regarding the Alabama Cavefish Recovery Plan, contact the Regional Director, U.S. Fish and Wildlife Service, Richard B. Russell Federal Building, 75 Spring Street, S.W., Atlanta, Georgia 30303.

REGIONAL BRIEFS

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reported sighting a banded peregrine (possibly an eastern) feeding on a pigeon outside their regional office building in Milwaukee, Wisconsin. There has also been a peregrine sighting recently in Iowa which, because of its location, might be one of the birds from the Minnesota release.

Region 4 — The Florida Game and Fresh Water Fish Commission has received 27 submissions for papers to be presented at the Red-cockaded Woodpecker Symposium to be held on January 27-28, 1983, at Panama City, Florida. The symposium is being cosponsored by the Fish and Wildlife Service and the Forest Service, and the State of Florida will serve as the host. Additional information and the agenda should be available in the near future. Those interested in attending should contact Don Wood, Division of Wildlife, Florida Game and Fresh Water Fish Commission, 620 South Meridian Street, Tallahassee, Florida 32301; telephone 904/488-3831.

Six additional specimens of the Tar River spiny mussel (*Canthyria* sp.) have been found in the Tar River, North Carolina, by Dr. Arthur H. Clarke, contractor for the status survey. These mussels were found within the original range for this species.

Region 5—Recovery plans for a number of listed species are progressing, thanks to the work of cooperating offices and agencies. An agency review draft of the Chittenango Ovate Amber Snail Recovery Plan, prepared by the State of New York, has been received, and an agency draft of the Flat-spired Three-toothed Snail Recovery Plan has been prepared by Andy Moser of the Service's Annapolis (Maryland) Ecological Services Office.

Efforts to recover the Endangered Virginia roundleaf birch (*Betula uber*) are beginning to show signs for optimism. The remaining wild population has declined steadily to a critical level of five adults and several seedlings (see the April 1982 BULLETIN). In order to enhance natural regeneration, areas within the adult trees' zone of seed dispersal were "opened up" in 1981, exposing the soil and removing competing vegetation to increase the chances of *B. uber* seed germination and seedling establishment. Approximately 50 new *B. uber* seedlings recently were counted on one of the prepared areas.

Region 6 — In September, a Service botanist searched potential habitat in Utah around the type locality for the purple-spined hedgehog cactus (*Echinocereus englemannii* var. *purpureus*), an Endangered cactus. Since a sighting of this variety hasn't been documented since the original collection over 30 years ago, the first recovery task identified in the draft recovery plan was a search for the plant. Individuals were found that fit the narrow definition of variety *purpureus*; however, these are intermixed on hillsides with individuals of *Echinocereus englemannii* var. *chrysocentrus*, a common variety occurring in Utah, Arizona, Nevada, and California. Individuals corresponding to var. *purpureus* represent at most only 5 percent of the *Echinocereus englemannii* plants in the vicinity of the type locality, with intermediate plants between the two varieties also present. Now that the first recovery task has been completed, we need to pursue the second recovery task, which is to determine the taxonomic distinctness of var. *purpureus*.

The Canadian Wildlife Serivce, the U.S. Fish and Wildlife Service, and involved States are again participating in a whooping crane (*Grus americana*) tracking program to determine what habitat is utilized by the migrating birds between Canada's Wood Buffalo National Park and Aransas National Wildlife Refuge in Texas. In fall 1981, a young-of-the-year whooper was successfully tracked throughout migration. Last spring, the bird migrated back to Wood Buffalo National Park, but unfortunately it was not tracked. The transmitter is still working, so the bird is being tracked again this fall. It will be interesting to see how closely its behavior parallels that exhibited last year.

Five young-of-the-year whoopers were fitted with transmitters early this

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REGIONAL BRIEFS

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year at Wood Buffalo National Park. Since then, two have been killed by wolves. It is hoped that at least one of the remaining young birds can be tracked along its entire migration route.

The Grizzly Bear/Wolf Technical Workshop was held on July 28-30, 1982, at Ford Station, Montana. Chris Servheen, Grizzly Bear Recovery Coordinator, served as chairperson for the meeting this year. Topics discussed included mapping grizzly bear (*Ursus arctos horribilis*) habitat, oil and gas activity in the Northern Rockies, wolf (*Canis lupus*) recovery and management, forest management practices, and limiting factors and monitoring of grizzly populations. The workshop was a success, with more than 140 individuals representing several agencies and institutions in attendance. A meeting of the Montana Bald Eagle Working Group preceeded the workshop on July 27.

Region 7 — The revised Aleutian Canada Goose Recovery Plan has been approved and signed by Director Jantzen. It is being printed and should be available for distribution within 60 days.

During the 1982 field season, the Division of Endangered Species and Raptor Management Studies surveyed or contracted for surveys in seven areas within interior and Arctic Alaska for peregrine falcons and other raptors. Approximately 1,250 river miles were covered. In addition, three other areas within the same regions, consisting of roughly 600 river miles, were surveyed by the Bureau of Land Management. In the interior, 88 pairs of American peregrine falcons (*P. f. anatum*), 14 lone adults, and 160 young were observed. In the Arctic (*P. f. tundrius*) count, 37 pairs, 5 lone adults and 64 young were seen. A total of 200 young were banded statewide. The number of nesting pairs found in the interior was a few more than last year, but production was 20 percent less than in 1981. This decrease was probably a result of the late, colder than average spring experienced this year. For the Arctic peregrine falcon population, the number of pairs increased by 20 percent and production increased by roughly 50 percent.

Service personnel trapped 17 adult peregrines in 1982, 11 females and 6 males, and blood samples for pesticide analysis were taken. Eight of these birds were previously banded: two as adults last year and six as nestlings in 1979, 1980 and 1981. The two adults were breeding at the same cliffs they used in 1981. The second-year bird (a non-breeder) was occupying a cliff 3 miles from the cliff he fledged from last year. Three third-year birds and two older birds were breeding at cliffs up to 140 miles from the cliff where they fledged. One female, banded as a nestling on the Yukon River in 1979, was breeding on the Tanana River this year. At five cliffs where birds were trapped in both 1981 and 1982, five of the ten birds were different in 1982, three were the same, and two were unknown. If this trend continues, it would indicate either a much higher adult turnover rate or a much lower site fidelity than previously thought, or both.

BOX SCORE OF SPECIES LISTINGS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL
Mammals	15	18	223	3	0	22	281
Birds	52	14	144	3	0	0	213
Reptiles	7	6	55	8	4	0	80
Amphibians	5	0	8	3	0	0	16
Fishes	28	4	11	12	0	0	55
Snails	3	0	1	5	0	0	9
Claims	23	0	2	0	0	0	25
Crustaceans	2	0	0	1	0	0	3
Insects	7	0	0	4	2	0	13
Plants	55	2	0	8	1	2	68
TOTAL	197	44	444	47	7	24	763

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, American alligator, green sea turtle, and Olive ridley sea turtle.

Number of species currently proposed: 4 animals
6 plants

Number of Critical Habitats listed: 52
Number of Recovery Teams appointed: 69
Number of Recovery Plans approved: 59
Number of Cooperative Agreements signed with States:
38 fish & wildlife
11 plants

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